SPECIAL HANDLING

OXE-3696
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SHC62-9015-172

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15 June 1962

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Processor Progress Report from 1 April 1962 to 1 May 1962

Introduction

The month of April was devoted primarily to work with flight test film. One of the flight tests showed rivers, streams, city areas, fields, roads, and possibly a transmission line. This was the first time the correlator was run for long periods and some time was spent in the resulting "shake down." A new test film was completed and preliminary runs were made with it.

Processor Engineering and Modifications

The modifications made to the unit during the month of April are indicated in Figs. 1 and 2.

During April the Processor was run for long periods with tetrachloroethylene in the platen. It was determined that approximately one pint of fluid a day would be pulled out by the film and evaporated. For this quantity and the anticipated film speed no squeegee will be necessary as the fluid evaporates before the film reaches the take-up spool.

The fumes of the tetrachloroethylene and the typical hydrocarbon breakdown products that are formed were quite objectionable. This situation was corrected by installing a ventilation system for the processor cabinet.* The present system is designed to exhaust 250 cubic feet of air per minute from the top of the processor. This reduced the tetrachloroethylene level to about 30 parts per million in the room atmosphere, well below the permitted level of 100 ppm. Additional baffles and hoods may be added at a later

*Ventilation techniques were studied during the design period in 1961, but the lack of information regarding the quantity of fumes and air flow patterns prevented solution of the problem at that time.

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date to further decrease the fumes in the room. This ventilation system should be separate from that for the carbon arc.

The new cylinder lenses are being fabricated and the following schedule is predicted.

Table I

Lens drawing	5043	5044	5045
Range	Both	Far	Near
Delivery:			
Perkin-Elmer	5/20/62*	6/ 4/62	7/16/62
Diffraction, Ltd.	7/19/62	6/20/62	7/ 5/62

The platen glass had been received and is due to be complete during the middle of June. The mechanical parts will be ready at that time.

The output drive wheel was replaced as it had several low spots on the rubber tire.

Test and Simulation

Previous work done on the Test and Simulation program has been with small pieces of film which were aligned by hand and correlated statically. Tests with very narrow (.001 inch wide) "dot" patterns had been used and proved to be beyond the capability of the correlator using the present cylinder lenses. The dot images were difficult to locate and slight rotation of slit, film or the cylinder lenses would smear them out. It was, therefore, felt that line patterns would supply the most information for dynamic tests. A test film was made so that we might check resolution, effect of multiple overlapping, and effect of high and low density patterns on each other. The film was made by making a series of exposures along $9\frac{1}{2}$ inch film so that it could be run and all results analyzed together. Each pattern is squinted and has a 150 inch focal length in green light. Each set of patterns has two or

*Recent information indicates that the first lens will be shipped about 6/20/62.

five patterns separated by a decreasing amount so that the minimum separation that is resolved may be determined. The film is designated as T115 and is described in Table II. A second test film designated as T116 was made in the same manner except that the pattern was contact and recontact printed on extremely grainy film before being exposed on the 9½ inch film to simulate noise in both spaces and pattern lines.

Table II

Test Film T115, T116	Patterns Per Set	Sets Per Series	Density	Separation of Patterns (inches)
Series I	2	12	both high	.000, .040*, .036, .028, .024*, .016, .012, .008, .004*, .000**
Series II	2	12	both medium	same as series I
Series III	2	12	both low	same as series I
Series IV	5	5	all high	.060, .045, .030, .015, .000
Series V	5	5	all low	same as series IV*
Series VI	2	12	high-low	same as series I
Series VII	2	12	low-high	same as series I

Test film T115 was run four times during April and the results are summarized in Table III.

* Shown in Fig. 3.

** Single pattern for line width test.

Table III

Test Film Input Separations Resolved.*

	Output Single Line Width	High Density Pair Ser. I	Medium Density Pair Ser. II	Low Density Pair Ser. III	High Density Five Ser. IV	Low Density Five Ser. V	Hi-Lo Density Pair Ser. VI	Lo-Hi Density Pair Ser. VII
T115C1	none resolved (NR) out of focus due to error in mirror position.							
T115C2	.010	NR	NR	NR	.045	.045	NR	NR
T115C3	.008	.032	.032	.032**	.030	.030***	NR	NR
T115C4	none resolved. Film did not track.							

* For output image separation divided by 4.

** See Fig. 4.

*** See Fig. 5.

In these initial runs for this test film the maximum resolution obtained was .008 inches line width and separation whereas the design goal is approximately .001 inches. This was probably caused by three conditions: 1) poor cylinder lenses, causing both spreading and difficulty in focusing, 2) error in the input to output film drive ratio, and 3) over-exposure. Further tests will be made to isolate and eliminate each of these conditions.

Figure 3 shows the images of pairs of patterns where .010, .009, and .008 inches are resolved and .007 and less are not. Figure 5 shows groups of five pattern images with .060, .045, and .030 inch separation resolved and .015 is not.

No positive conclusions can be drawn at this time since only one film is available.

Flight Film Support

Three flight test films were received and developed, during April. The first two films, containing runs S6, S7, and S8 were correlated. Various modifications and details of the program were discussed with Westinghouse and Scientific Engineering Institute engineers to coordinate the tests. After run S7 the flight tests were run at a lower altitude and closer range to increase the signal strength. This raised certain problems in the correlator, but these were not as serious as the lack of signal strength.

Communication has been established by sending duplicates of all data film and duplicates or prints of significant correlated material to Westinghouse. The Westinghouse engineers visited Itek while we were working on S6 and S7.

Flight S6 and S7 film was received on 11 April. There appeared to be three areas of information. One of these areas on Flight S6 was set up visually and processed. No recognizable landmarks were present. Figure 7 shows the area correlated from Fig. 6. A through focus run of this area provided no additional details.

Flight S8 film was received on 25 April. This was the first low altitude flight. It showed the most promise as an extensive area including a bend and tributary of the Potomac River are obvious on both the flight and correlated films. Figures 8, 9, and 10 show the area correlated in Fig. 11. The film was run with a green interference filter since the wedge filter does not match the slope of the film when run at this altitude. Also if the wedge filter was matched at one point only about half the film would be correlated with the other half blocked off by the filter holder.

Flight S9 was received on 28 April. There appeared to be no information on this film and it was returned immediately to

[redacted]

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Sincerely yours,

[redacted]

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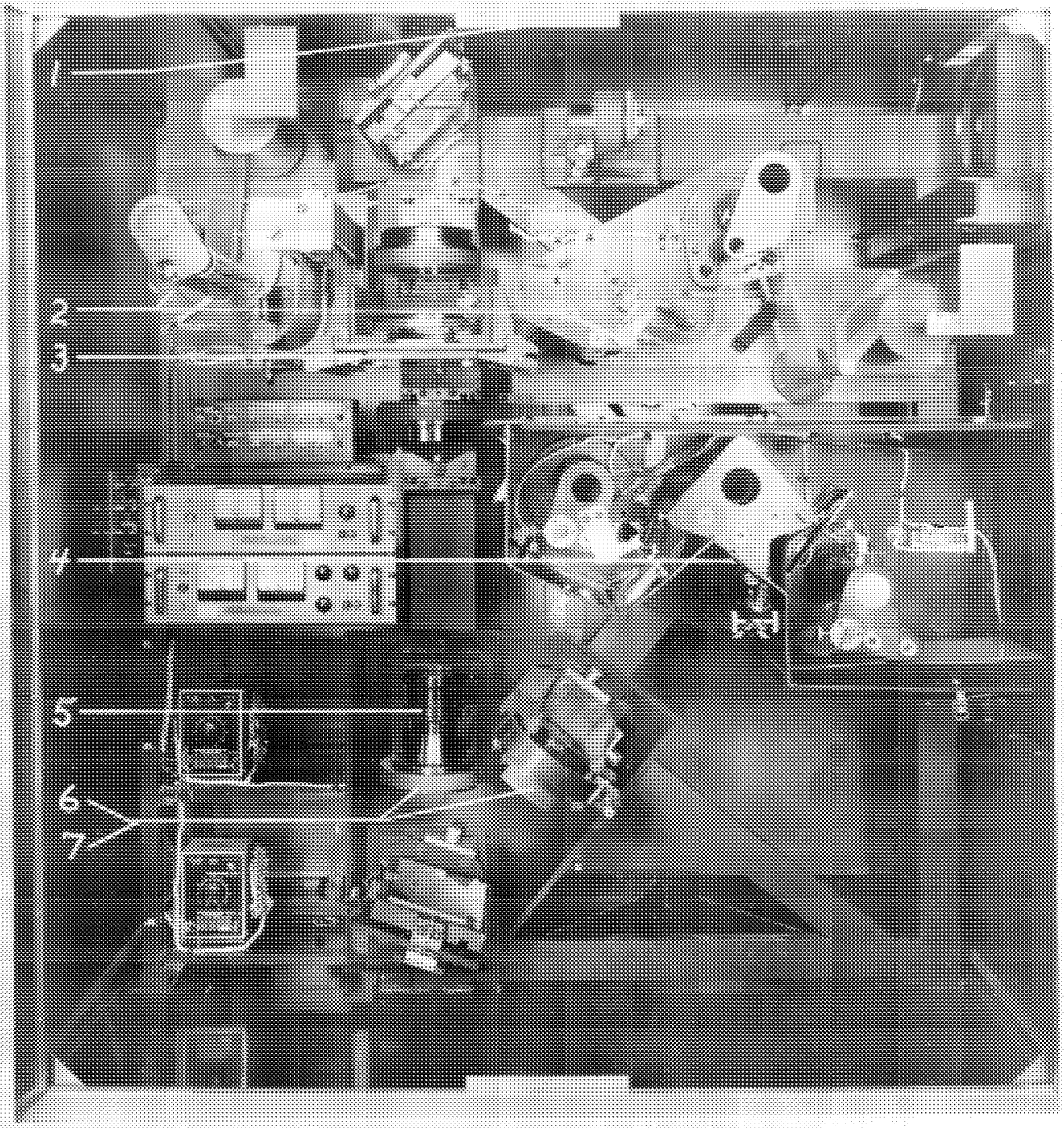
WJD/bh

Key to Figs. 1 and 2

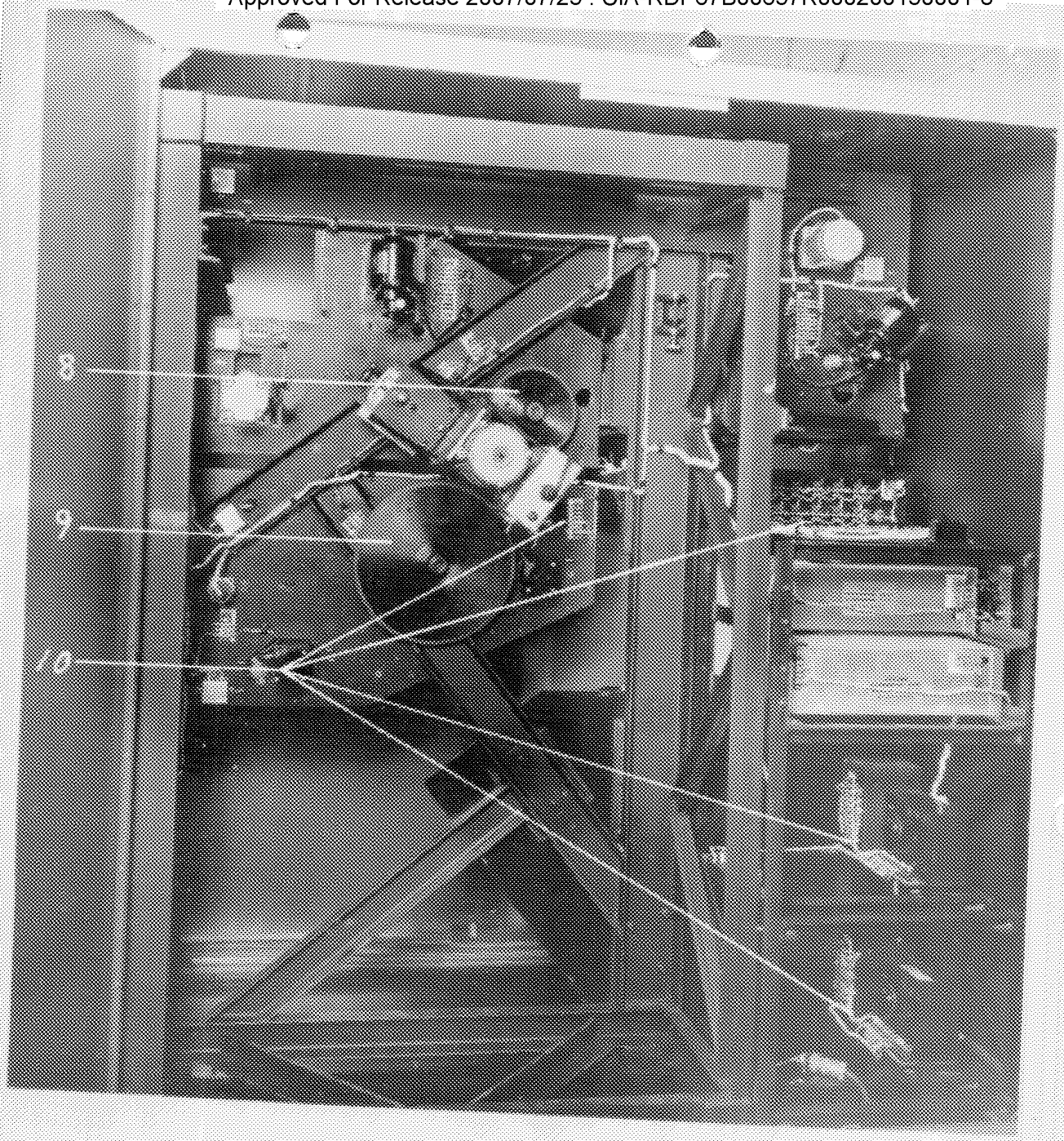
NOTE: **The photographs serve only to identify the part and area under question. The new parts are not shown.**

1	Exhaust (temporary)	installed
2	Single pressure wheel	fabrication
3	Platen and plate tray	fabrication
4	Slit and filter holder	fabrication
5	Zero order stop	designed
6	Cylinder lenses	fabrication
7	Cylinder lens mount	fabrication
8	4.37:1 input drive wheel	fabrication
9	Output drive wheel	installed
10	Terminal board cover plates	installed



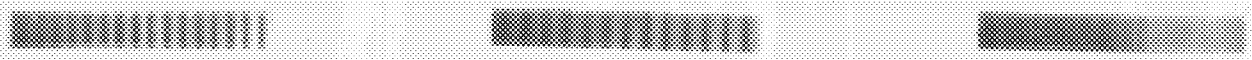
Modification Locations - Front

Figure 1



Modification Locations - Back

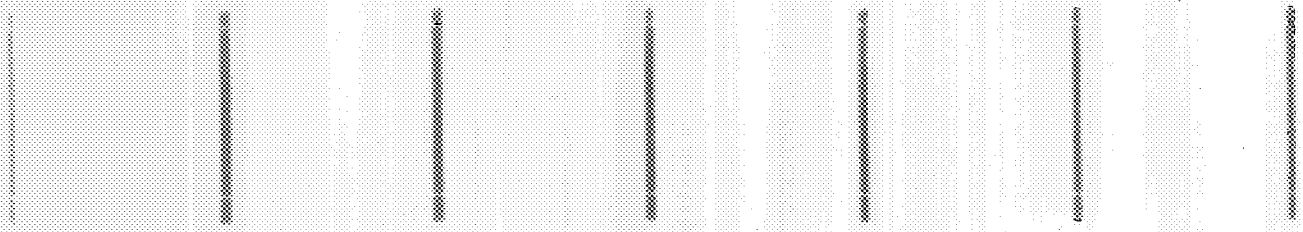
Figure 2



Overlapped Pattern Pair

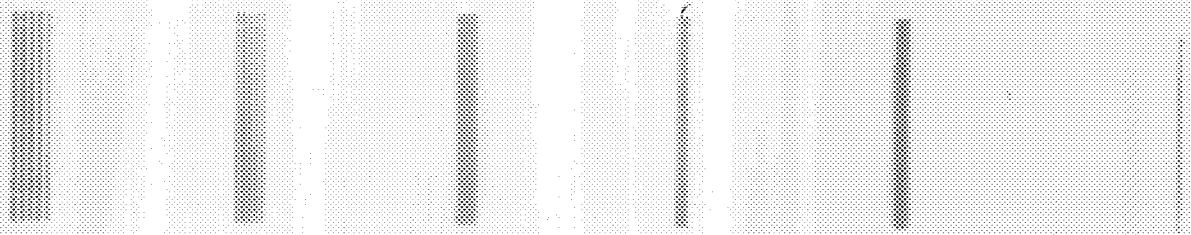
Group of Five Overlapped Patterns

Figure 3



Line Pattern Pair Images (3X)

Figure 4



Line Pattern Group of Five Images (5X)

Figure 5

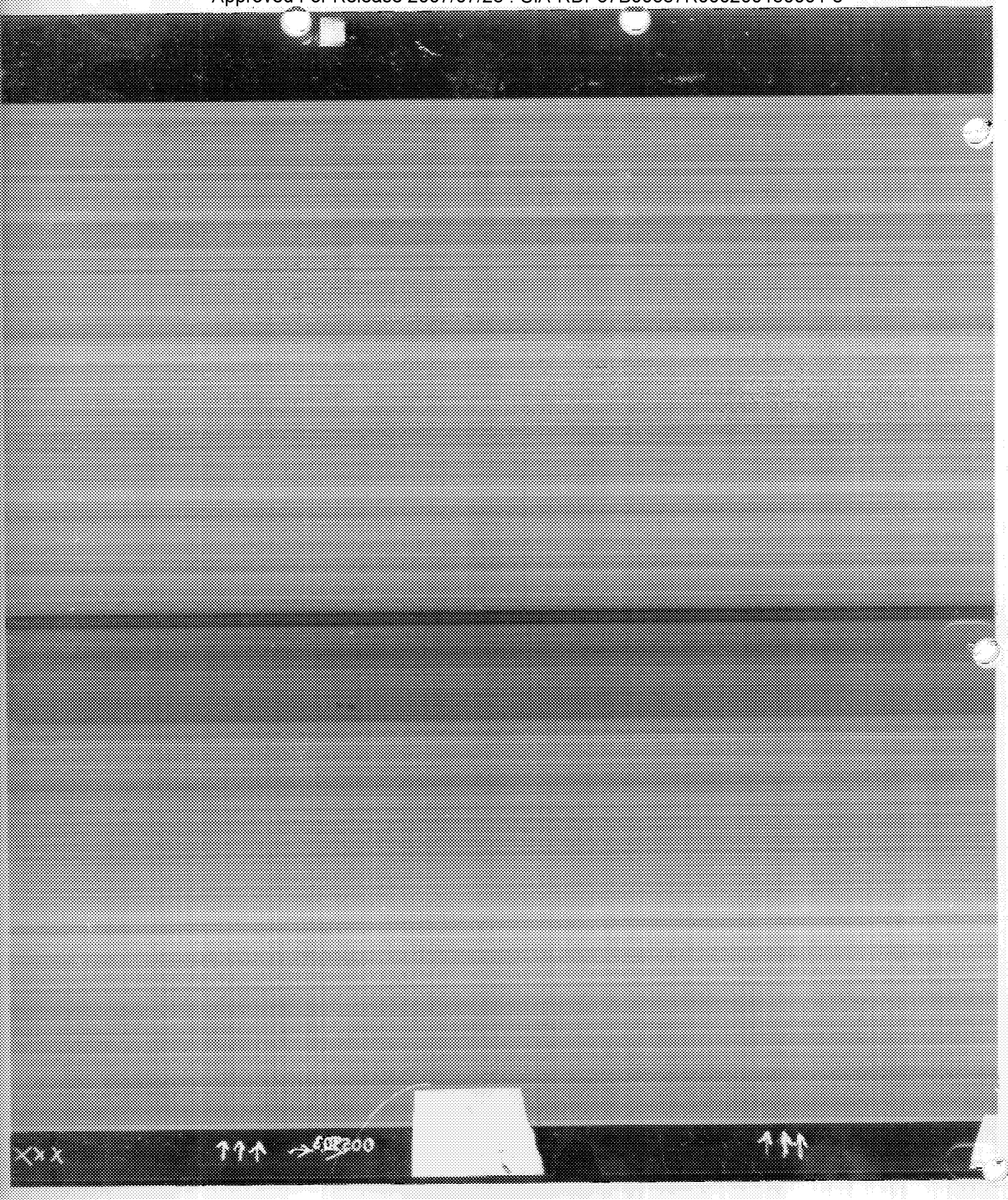


Figure 6

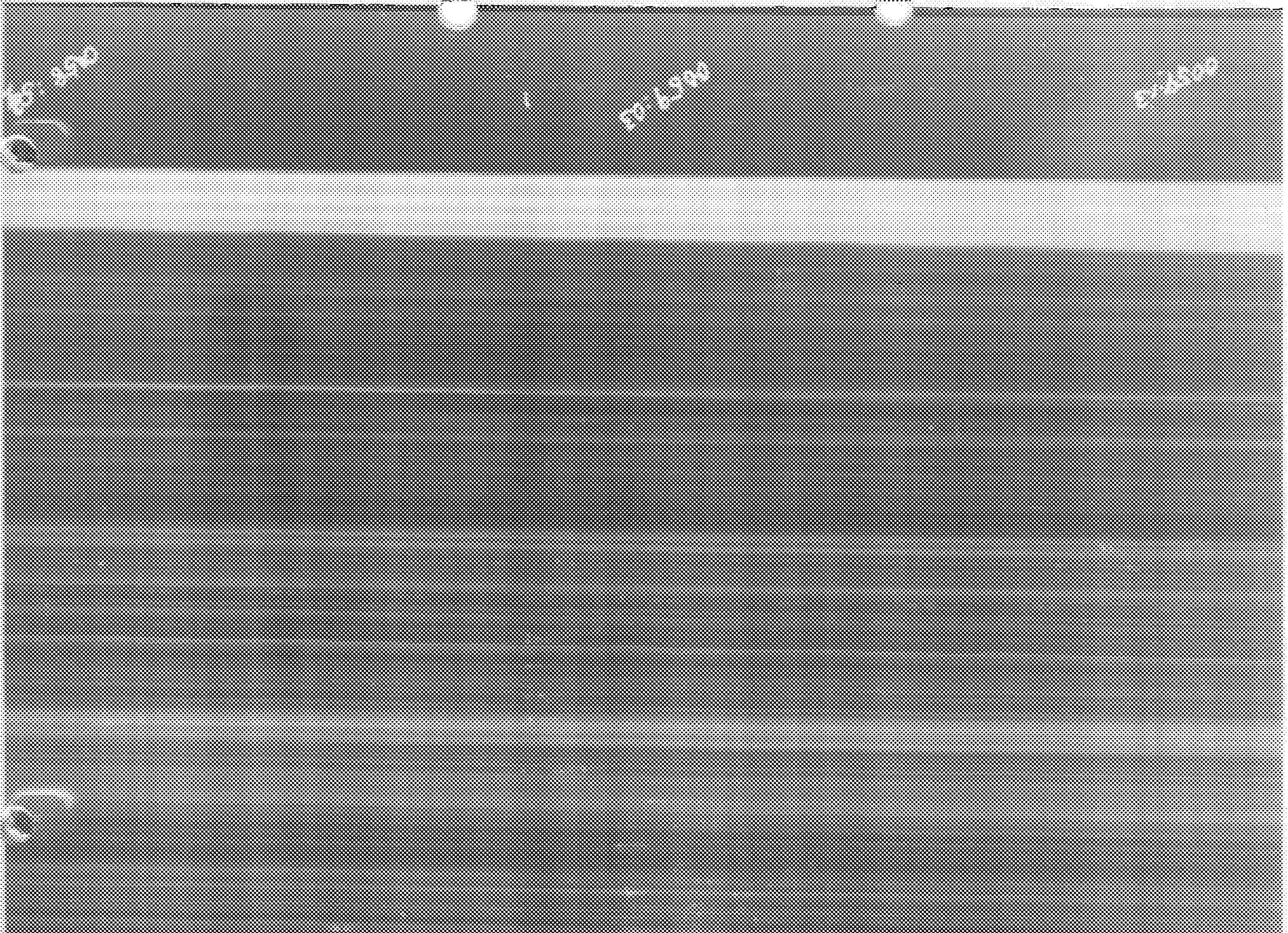


Figure 7

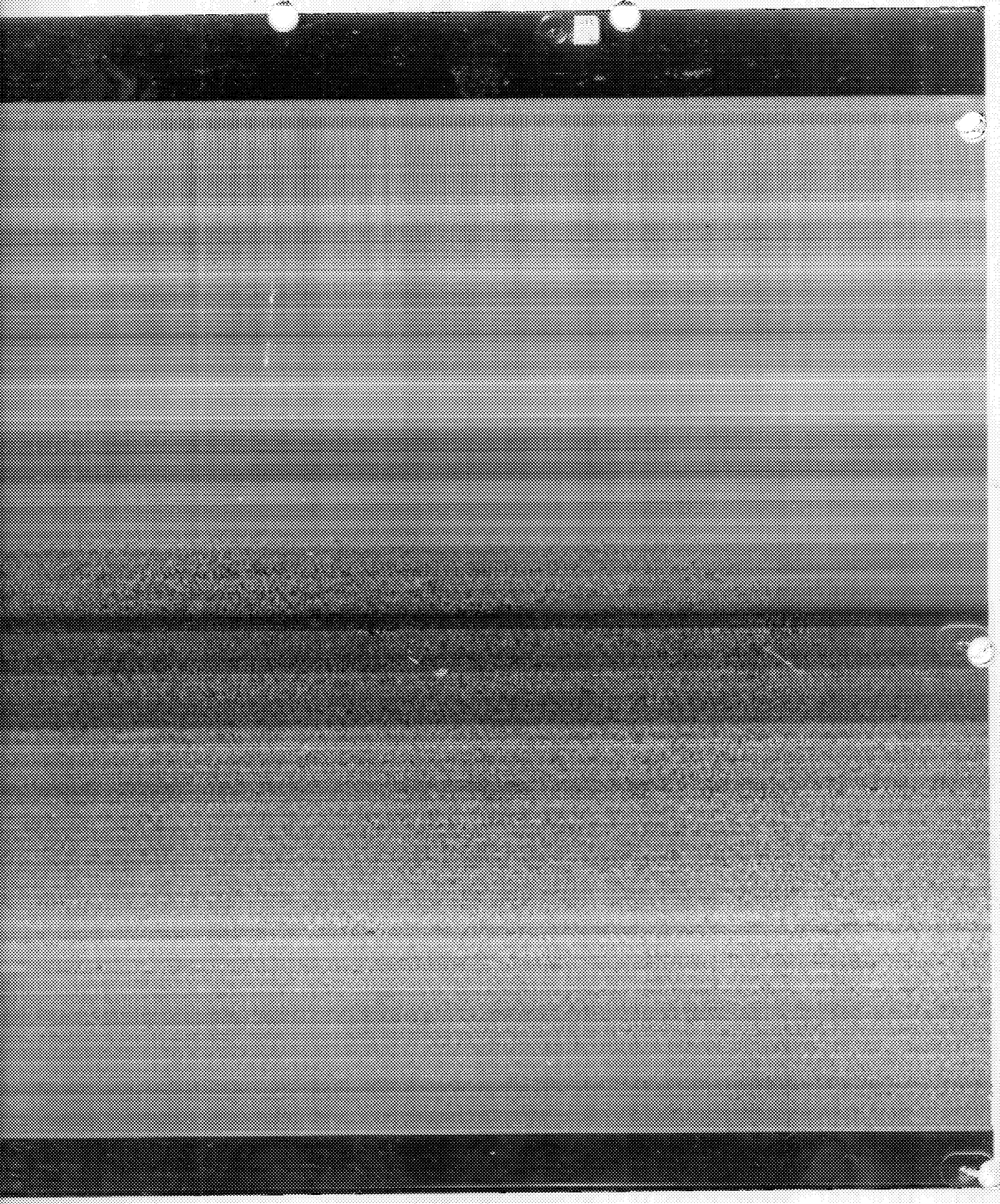


Figure 8

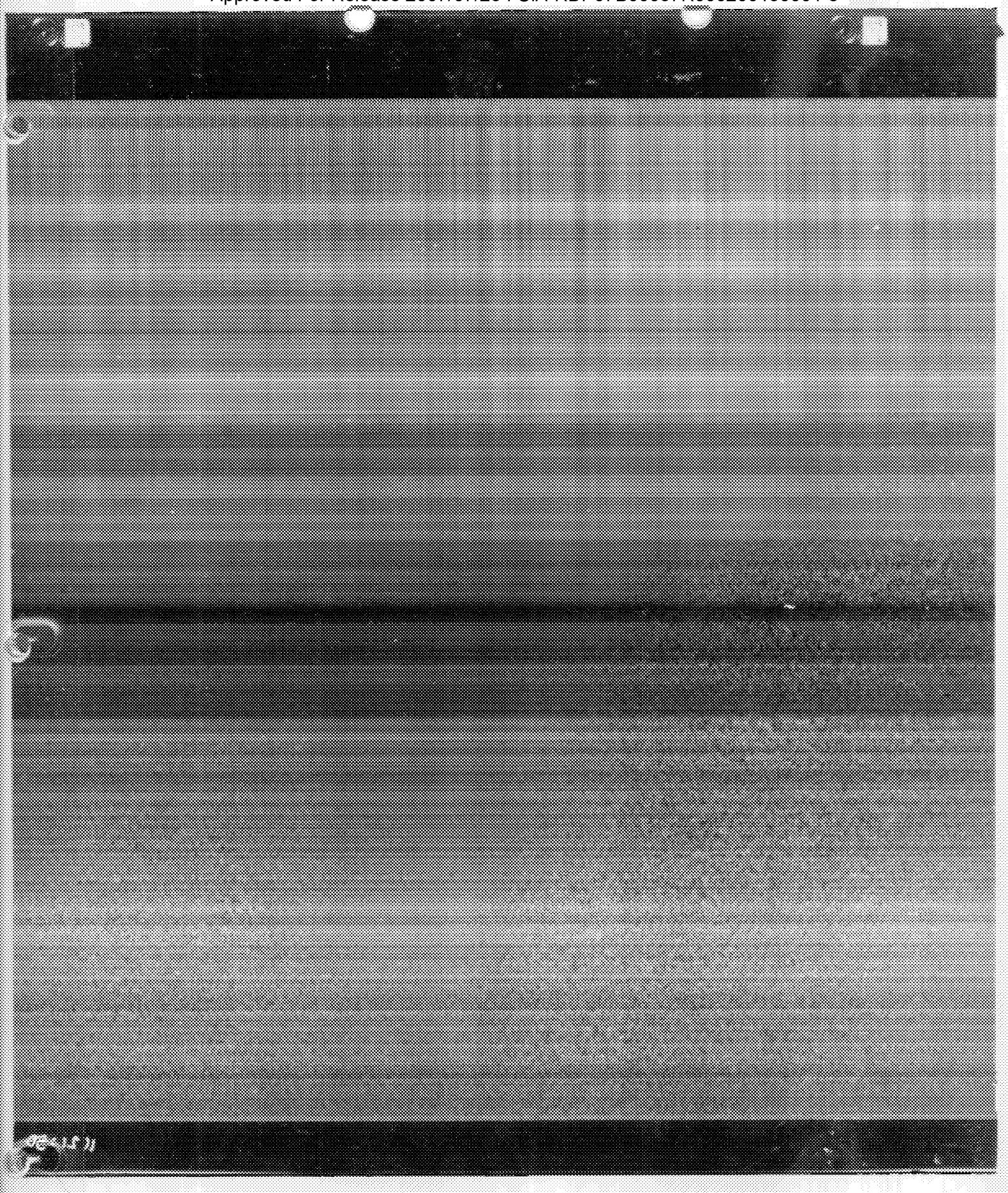


Figure 9

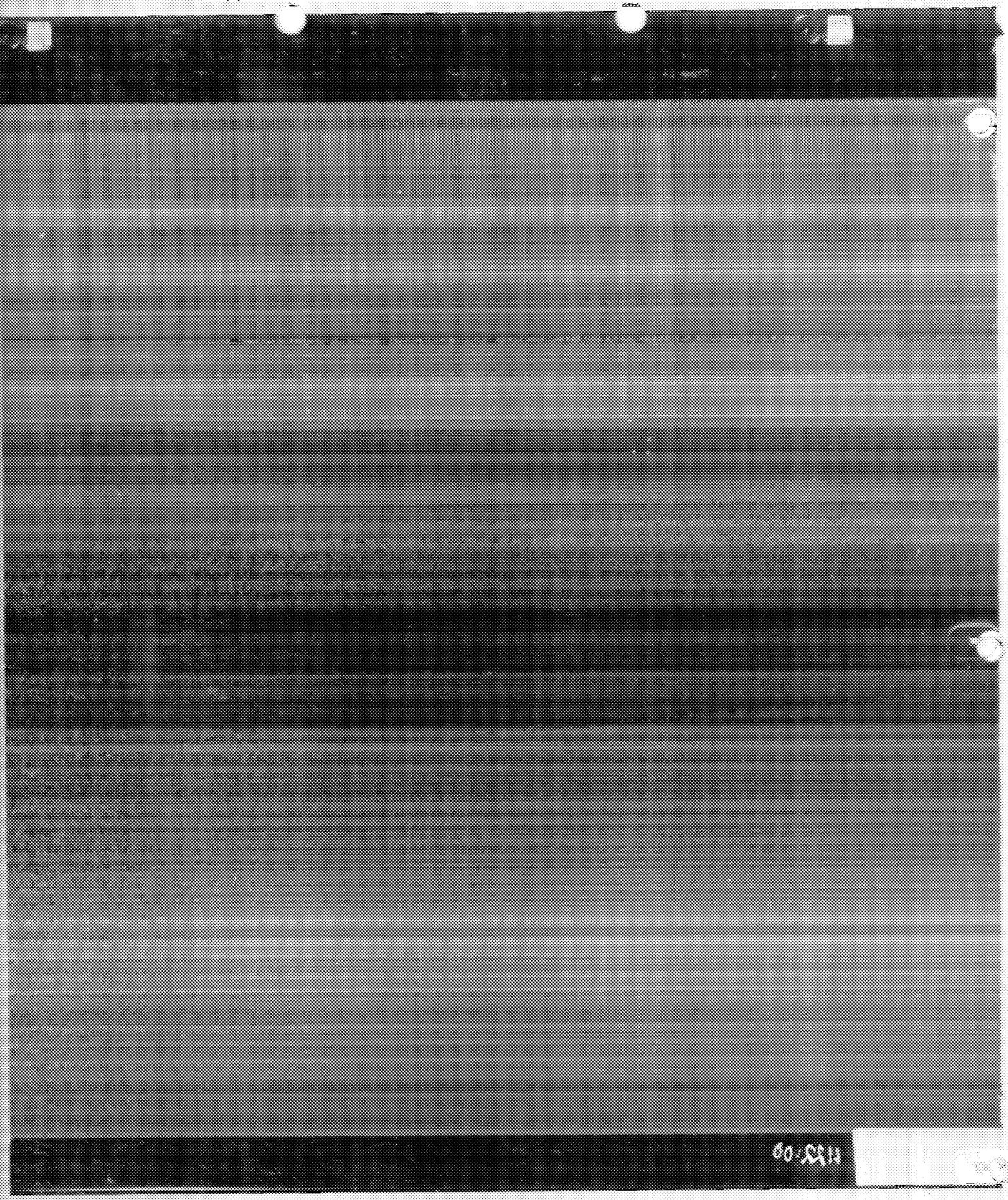


Figure 40

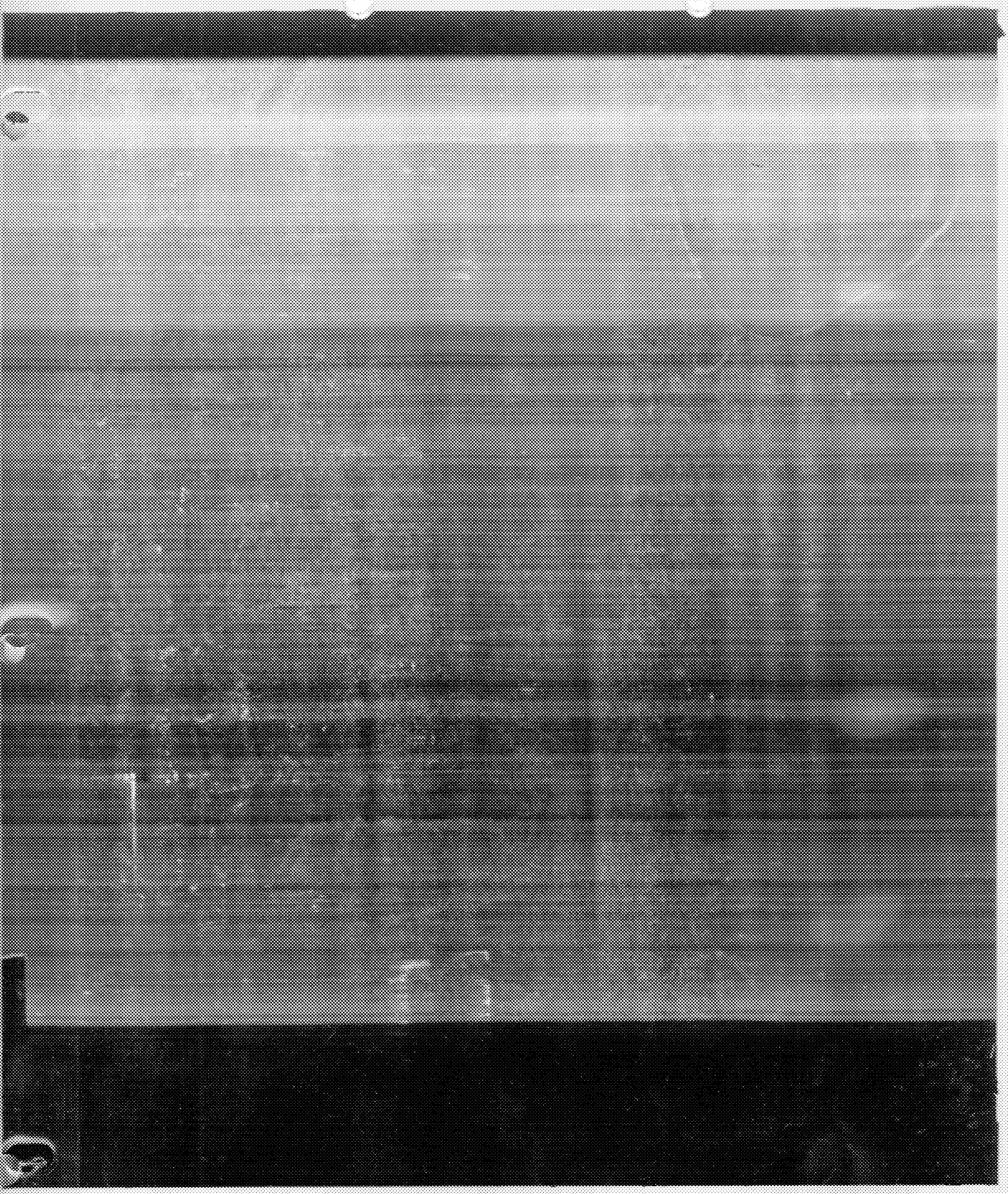


Figure 11